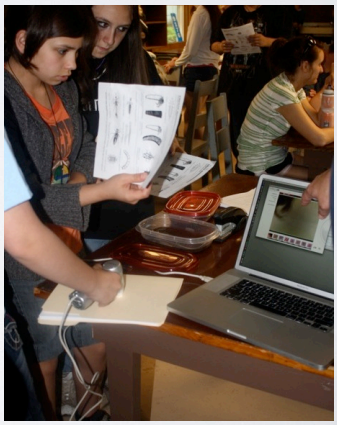
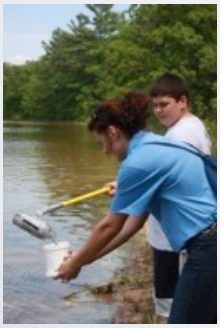
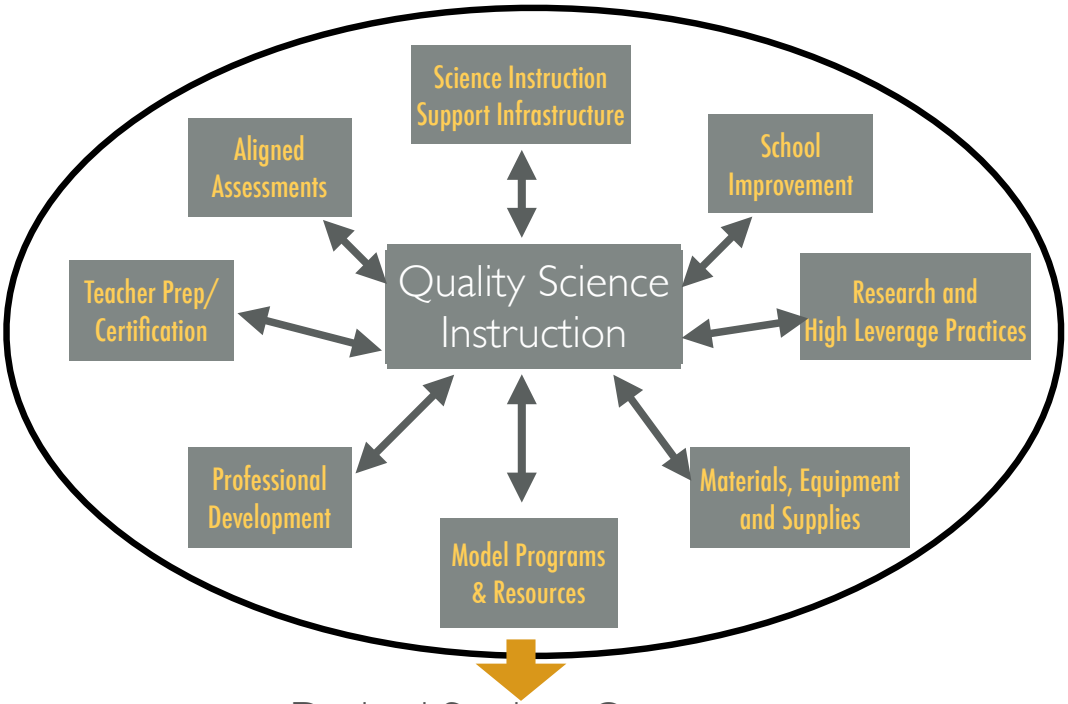
Michigan Science Standards





ACHIEVING THE VISION



Desired Student Outcomes

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OBJECTIVES

- Review considerations for transitions in science education to meet performance expectations based on the Framework for Science Education
- Summarize reviews and public feedback of current and proposed science standards for Michigan
- Present draft standards for science education in Michigan, and next to support implementation by the field

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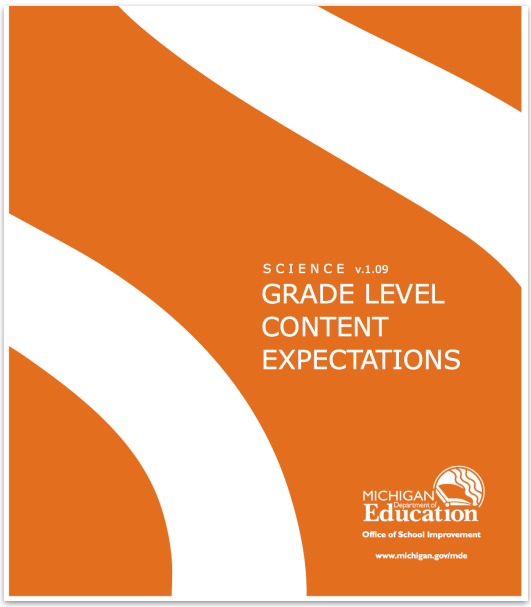
CURRENT STANDARDS

- Approved in 2005
- K-7 Grade Level Content Expectations (GLCEs) and High School Content Expectations (HSCEs)
- Followed by Companion Documents and topic-based mapping tools for support



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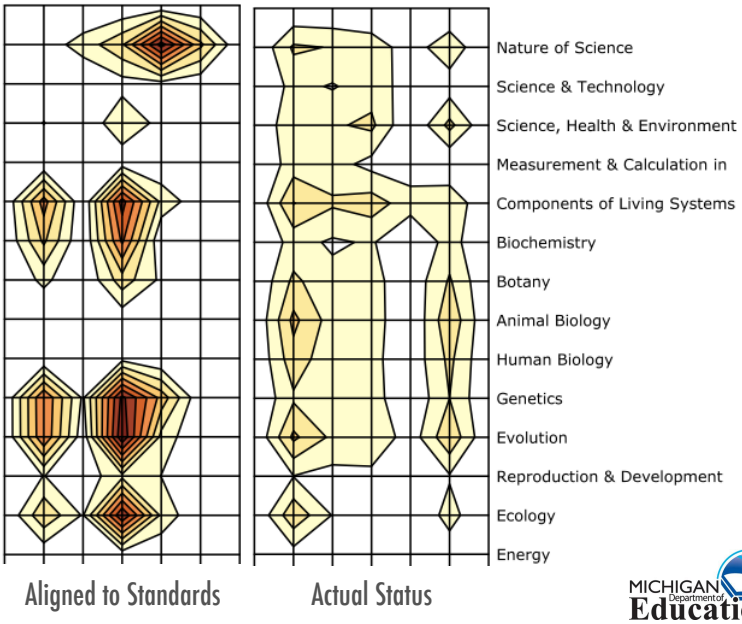
OUTCOMES OF CURRENT STANDARDS

- Content is still addressed as information, including "legacy topics"
- Analysis and practices are skimmed over and treated as content - breadth vs depth
- General lack of engagement or investigation of ideas - focus on coverage



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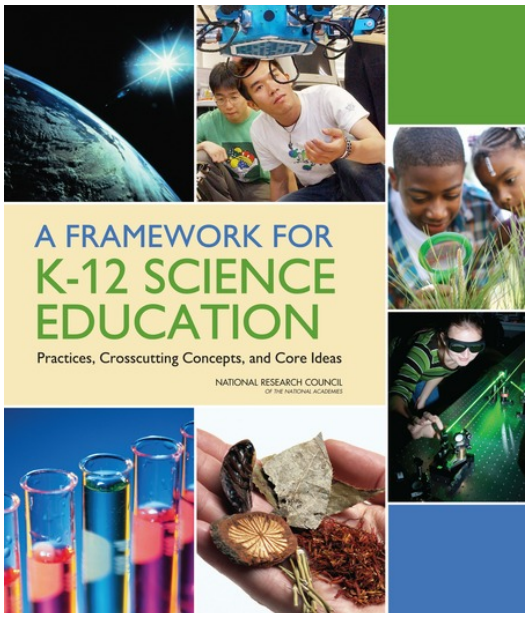
A RESEARCH-BASED TRANSITION



PRIMARY ISSUES:

- Incorporation of practices from the field
- No cross-cutting practices or integration
- Lack of understanding of learner needs

LEAD TO TRANSITION:

- Effort to restructure standards based on research findings and current landscape

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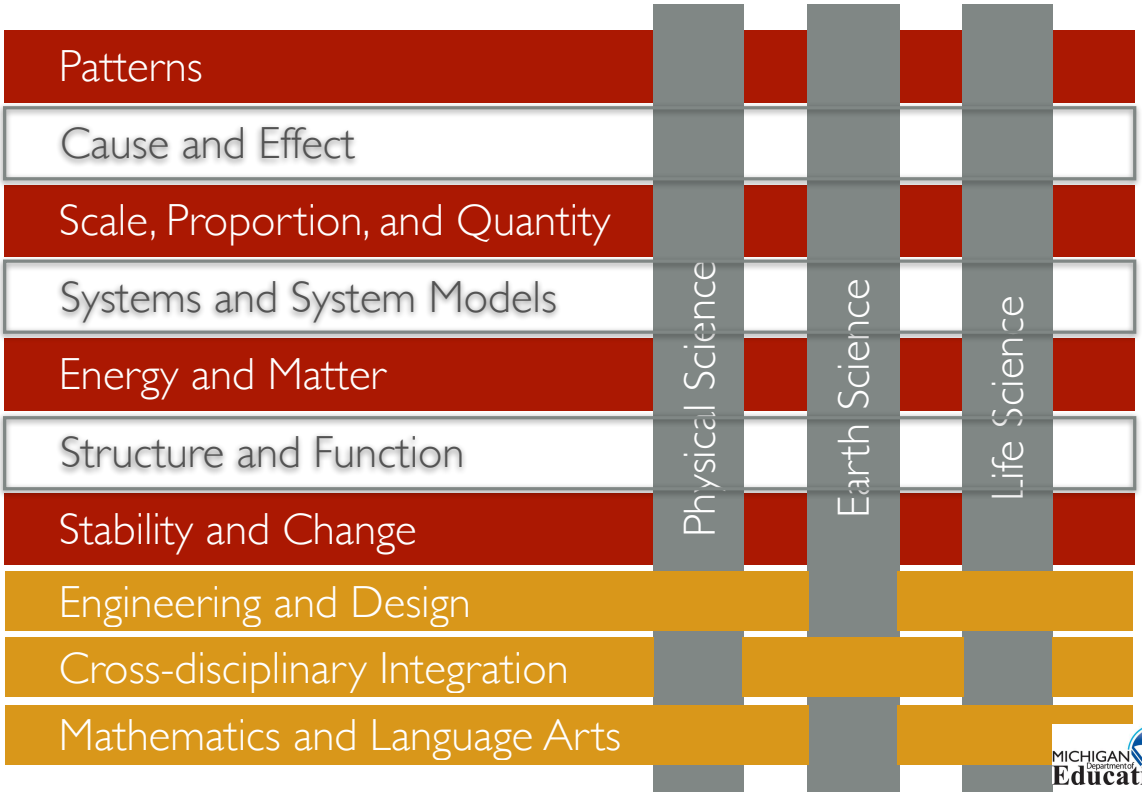
CROSS-CUTTING CONCEPTS



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DEVELOPMENT EFFORT

NEXT GENERATION SCIENCE STANDARDS
For States, By States

- Michigan was one of 26 lead states involved in the development effort
- Several parties involved in science education in Michigan became partners in development and implementation
- Since publication, this has become the default resource and focus for Michigan science educators

MICHIGAN SCIENCE TEACHERS ASSOCIATION

Michigan Mathematics and Science Centers Network

MICHIGAN STEM PARTNERSHIP

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A REVIEW OF STANDARDS…

MDE / Wayne RESA contract with SRI International:

- External, independent content comparison review
- Michigan Science Standards (GLCE and HSCE) to Next Generation Science Standards

Methodology:

- Crosswalk framework
- Content analysis for similarities and differences

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…AND THEIR IMPLICATIONS

To what extent would the adoption of the NGSS (or the identified cross-cutting concepts, science and engineering practices, disciplinary core ideas, and student performance expectations) represent an improvement over the current Michigan Science Standards, based on the Framework for K-12 Science Education?

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RECOMMENDATIONS AND RATIONALES

Recommendations	Rationales
Michigan should consider the adoption of the NGSS performance expectations in order to improve science education in all grades.	**The value added by the adoption of the NGSS includes access to current science concepts that are required to prepare students for college and careers.**
The NGSS Science and Engineering Practices and Crosscutting Concepts should be implemented to enhance current science education instruction for grades K-12.	**The NGSS Science and Engineering Practices and Crosscutting Concepts are embedded across the NGSS performance expectations and provide coherence across grades and all science disciplines.**
The NGSS performance expectations for the Disciplinary Core Ideas in Engineering, Technology and Application of Science contain new content that should be included in science instruction across all grades.	**Implementation of the NGSS performance expectations in new content areas such as Engineering, Technology and the Application of Science will prepare students for solving future and current societal problems.**
The NGSS performance expectations provide explicit connections to Common Core Mathematics and English Language Arts Standards that should be integrated into science instruction.	**The NGSS linkages to the Common Core Standards for Mathematics and English Language Arts connect consistent performance expectations across core content areas.**
NGSS Professional Development Resources that support instruction in new content areas are available through participation in the NGSS Network and should be leveraged to support Michigan science teachers.	**On-going, high quality professional development that includes current science concepts is essential to improvements in science instruction.**

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MICHIGAN SCIENCE STANDARDS

WHAT IS INCLUDED:

- Cross-cutting Concepts (organizational frame)
- Science and Engineering Practices (integrated into performance expectations)
- Disciplinary Core Ideas
- Student Performance Expectations

WHAT IS NOT INCLUDED:

- Ancillary Materials (Appendices, Models, Crosswalks, etc.)

WHY?:

- Offer greater flexibility for local implementation in Michigan's school districts and public school academies

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PROPOSED SCIENCE STANDARDS

2nd Grade Michigan Science Standards	
Crosscutting Concept: Patterns Patterns of change can be used to make predictions.	
Performance Expectations Students who demonstrate understanding can:	**Disciplinary Core Idea**
2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. **2-ESS2-2** Develop a model to represent the shapes and kinds of land and bodies of water in an area. **2-ESS2-3** Obtain information to identify where water is found on Earth and that it can be solid or liquid.	**PS1.A: Structure and Properties of Matter** Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) **PS1.A: Structure and Properties of Matter** Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3) **ESS2.B: Plate Tectonics and Large-Scale System Interactions** Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) **ESS2.C: The Roles of Water in Earth's Surface Processes** Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)
Crosscutting Concept: Cause and Effect Cause and effect relationships are routinely identified, tested, and used to explain change.	
Performance Expectations Students who demonstrate understanding can:	**Disciplinary Core Idea**
2-PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* **2-PS1-4** Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.	**PS1.A: Structure and Properties of Matter** Different properties are suited to different purposes. (2-PS1-2) **PS1.B: Chemical Reaction** Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)

1. Organized by Cross-Cutting Concepts at each grade level or grade band
2. Science and Engineering Practices are embedded in the performance expectations
3. Disciplinary Core Ideas are identified for each Cross-Cutting Concept, and color coded to cross reference multiple iterations of core ideas across grade levels (to include learning progressions)

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OTHER CONSIDERATIONS

COMMENTS FROM THE FIELD:

- Strong support for new science standards based on the Framework
- Initial public comment and surveys addressed awareness and implementation considerations
- Partner organizations are eager to move forward

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NEXT STEPS

1. Legislative report addressing science education, the standards, and their implementation considerations will be sent to the legislature this month
2. MDE can implement a second abbreviated public comment process to provide feedback by the December 2014 State Board Meeting
3. Following adoptions, MDE will roll-out and implement the standards in policy and through guidance and support to the field

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